REMARKS

The Office Action mailed October 22, 2003, has been carefully considered. The present Amendment is intended to be a complete response thereto and to place the case in condition for allowance.

Claims 1, 3, 5-6, 8-22, and 32-39 are pending. Claims 2, 4, 7, and 23-31 have been cancelled without prejudice to the subject matter therein. Claims 1 and 8 have been amended. Claims 36-39 have been added. Support for the amendment to claim 1 is found, *inter alia*, in original claim 7; and in the specification on page 1, paragraph 2; page 5, paragraph 25; and page 6, paragraph 31 (last line). Claim 8 has been amended to be dependent on claim 1. Support for new claim 36 is found, *inter alia*, in the specification on page 14, paragraph 78. Support for new claim 37 is found, *inter alia*, in the specification on page 12, table, and page 4, paragraph 21. Support for new claim 38 is found, *inter alia*, in the specification on page 3, paragraph 17, and page 4, paragraph 21. Support for new claim 39 is found, *inter alia*, in the specification on page 4, paragraph 23.

Claims 1-30 and 32 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner alleges that 1) claim 1 and 23 are confusing because they state that "a molten thermoplastic 'comprises' a blowing agent"; 2) claim 4 is indefinite because "take" is used rather than - -selected- -; 3) claims 25 and 26 are indefinite because the use of "such as"; 4) claims 28 and 30 are indefinite because "an amount" should be - -said amount- -; and 5) claim 30 is indefinite because the designation "2t" is confusing. The rejection is moot with respect to claims 4, 7, and 23-31, because those claims have been cancelled. Applicants respectfully traverse the rejection with respect to the pending claims.

Applicants have amended claim 1 to delete the word "comprises" and substitute therein instead - -containing- -, substantially as suggested by the Examiner. Therefore, the claim is now definite and withdrawal of the rejection is earnestly solicited.

Claims 1-20, 23-30, and 32-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nishikawa et al. (U.S. Patent No. 5,830,393). Claims 21-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nishikawa et al. in view of Colon (U.S. Patent No. 4,322,260). The rejection is moot with respect to claims 4, 7, and 23-31, because those claims have been cancelled. Applicants respectfully traverse the rejection of the pending claims over Nishikawa et al.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *See* MPEP 2143.

First, the cited reference fails to disclose, teach or suggest all the claim limitations. In particular, Nishikawa et al. fail to disclose 1) the pressure drop rate (dP/dt) for releasing the pressure required by presently amended claim 1; and 2) the amount of foaming agent used in the manner of claim 1 ($X = \rho_{gas}/ \rho_{thermoplast}$). Nishikawa et al. disclose a method for forming a foam from at least one molten thermoplastic wherein a thermoplastic containing a foaming agent is subjected under pressure to a forming operation and, after the pressure is released, is cooled. The purpose of the method of Nishikawa et al. is to achieve small average cell diameter and uniform average cell density (column 1, lines 8-15). Nishikawa et al. disclose that the amount of

supercritical carbon dioxide and/or nitrogen is in the range of "0.1 to 30 parts by weight ... with respect to 100 parts by weight of the thermoplastic resin composition" (column 9, lines 62-67). The present composition, however, uses a maximum weight fraction defined by the relative densities of the gas to the thermoplastic (X). This is clearly not disclosed by Nishikawa et al.

Further, the present invention requires a minimum pressure drop rate (dP/dt) for pressure release defined by the equation:

$$dP/dt > (\beta R_o C_{ba}^2)/(\eta H^2)$$

where β is a proportionality factor, R_o is the critical cell radius, C_{ba} is the concentration of blowing agent in g/cm^3, η is the viscosity of the melt, and H is Henri's constant. This pressure drop rate is not contemplated by Nishikawa et al. No pressure drop rate is specified by Nishikawa et al. In column 14, lines 24-25, Nishikawa et al. merely mention that the "pressure reduction is carried out under conditions controlled by the shear rate adjusting section 12 without causing the abrupt pressure reduction at the die outlet ..." Thus, Nishikawa et al. only require that there is no abrupt pressure reduction; however, no minimum pressure drop rate is specified or disclosed. The present invention, therefore, requires greater control of the pressure drop rate than that specified by Nishikawa et al.

On page 3, first full paragraph, the Examiner alleges that Nishikawa et al. inherently provides a pressure drop rate within the range of claims 7-9; however, no rationale is given. According to MPEP 2112, the "Examiner must provide rationale or evidence tending to show inherency." To rely on inherency, "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied art." *Ex parte Levy*, 17 USPQ2d 1461 (Bd. Pat. App. & Inter. 1990) (emphasis in original). Moreover, "extrinsic evidence 'must make clear

that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 49 USPQ2d 1949, 1950-1951 (Fed. Cir. 1999) (citations omitted). Here, the Examiner fails to provide any reasoning why the teaching of Nishikawa et al. necessarily disclose that the minimum pressure drop rate is calculated from $(\beta R_o C_{ba}^2)/(\eta H^2)$. The Examiner fails to even make a case that the minimum pressure drop of the present invention may flow from disclosure of Nishikawa et al., which still does not meet the legal requirement for a finding of inherency. Therefore, the Examiner has clearly failed to show that Nishikawa et al. inherently disclose the minimum pressure drop rate of the present invention.

Second, one of ordinary skill in the art would not have any motivation to modify the teaching of Nishikawa et al. to arrive at the present invention. The purpose of the present invention is completely different from that of Nishikawa et al. Nishikawa et al. is concerned with preparing expanded thermoplastic having very small average cell diameter and uniform average cell density (column 1, lines 8-15). On the other hand, the present invention is concerned with producing a close-packed structure of the foam cells.

Applicant has discovered that excellent mechanical properties and product reproducibility can be accomplished by having a close-packed structure of the foam cells. This is accomplished by practicing the method of claim 1, namely having the total volume of the cells in a close-packing approximates 50% of the total volume of an article made of such foam material. This implies that the relative density ($\rho_{foam}/\rho_{thermoplast}$) of a micro-foam article of the present invention is about 0.5. On page 3, a calculation is given to calculate the maximum weight fraction of gas

to be used corresponding to a close-packed structure of foam cells. Such calculation can be made for any thermoplastic and any foaming agent when values for their densities are known (X = $\rho_{gas}/\rho_{thermoplast}$).

Further, Applicant has also discovered that not only the amount of gas controls the formation of a close-packed foam cells structure, but also the pressure drop rate. It was discovered that the pressure drop rate has to be controlled to be above a minimum value given by $(\beta R_o C_{ba}^2)/(\eta H^2)$ and not higher than 50 MPa/sec.

Overall, Applicant has unexpectedly discovered that 1) a close-packed foam cell structure produces excellent mechanical properties and reproducibility; and 2) the close-packed structure can be produced with any thermoplastic and gas as long as the maximum weight fraction of gas to be used is equal to the ratio of the density of the gas to that of the thermoplastic ($\rho_{gas}/\rho_{thermoplast}$) and the pressure drop rate is greater than $(\beta R_o C_{ba}^2)/(\eta H^2)$ and not higher than 50 MPa/sec. These results are not disclosed, contemplated, or envisaged by Nishikawa et al.; and one of ordinary skill in the art would not have been motivated to modify the teaching of Nishikawa et al. to arrive at the present invention.

Therefore, for the reasons noted, the references do not render the claims obvious. Accordingly, the rejections under 35 U.S.C. § 103(a) should be withdrawn.

As all grounds of rejection have been addressed and overcome, entry of this Amendment and issuance of a Notice of Allowance of the pending claims, as now presented, are respectfully solicited.

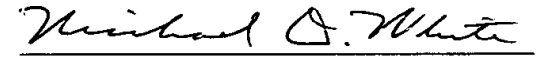
In the event that there are any questions relating to this Amendment or to the application in general, it would be appreciated if the examiner would telephone the undersigned attorney concerning such questions so that the prosecution of this application may be expedited.

Please charge any shortage or credit any overpayment of fees to BLANK ROME LLP, Deposit Account No. 23-2185 (000023-00106). In the event that a petition for an extension of time is required to be submitted herewith and in the event that a separate petition does not accompany this response, applicants hereby petition under 37 C.F.R. 1.136(a) for an extension of time for as many months as are required to render this submission timely.

Any fees due are authorized above.

Respectfully submitted,

JAN UILKE STOFFELSMA et al.

By: 

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